Matter and Energy Cycling in Ecosystems

NGSS-MS-LS2-3 Station Activity

Station 1

Hands-On, Minds-On

Task: Create a detailed plant cell diagram on
Label the following organelles and use specific colors:

- Nucleus (red)
- Cell membrane (blue)
- Cell wall (brown)
- Chloroplasts (green)
- Mitochondria (yellow)

Write one function for each labeled part.

Station 2

Fact Finder

Using the computer provided, research
answer the following questions on you

1. How do chloroplasts and mitochor
   together to keep a plant cell alive?
2. What would happen to a plant cell
   have chloroplasts?

Station 3

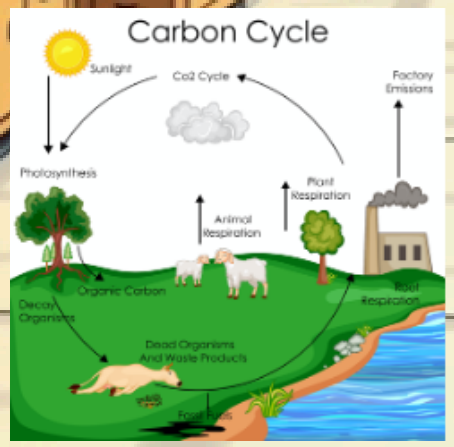
Write This Way

Imagine you are a cell membrane. Explain your typical day at work protecting and managing your cell. Include at least three specific jobs you do. Your answer must be 5-7 sentences.

Station 4

Apply Yourself!

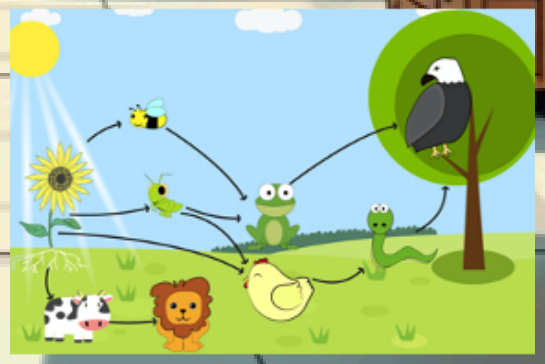
Read the following information article and answer the associated questions found below.



Station 5

Multiple Choice Madness

Answer the 10 multiple-choi
questions on your passport.



Station 6

The Question Master

You must create 1 multiple-choice question, 2 true/false questions, and 1 short answer questi
directly to the topic.
the answers, and yo
of the questions you

Station 7

Word Wizardry (complete when you are done all other stations)

Create an exit summary for your learning during the lab. You must write what you learned from performing the lab that you didn't know before and what you would like to learn more about in the future regarding the topic. Your answer should be at least 4-5 sentences in total and include details and examples for full marks.

NGSS Station Activity

Station 1: Hands-On, Minds-On - Students are required to draw or build to demonstrate their understanding

Station 2: Fact Finder - Using a classroom computer, students must research a specific question/issue surrounding the topic.

Station 3: Write This Way - Students write down an opinion to a question in paragraph form.

Station 4: Apply Yourself! - Students read a short article that connects the course content to a real-life situation and then they answer questions based on it.

Station 5: Multiple Choice Madness - Students answer 10 multiple choice questions based on the topic.

Station 6: The Question Master - Students must create 2 multiple-choice questions, 2 true/false questions, and 1 short answer question. Students must also supply the answers.

Station 7: Word Wizardry - Students create a summary of what they learned from the lab and what they would like to know more about.

NGSS Station Activity

Little to no prep, just print and go.

7 Engaging Stations.

Each station tests your students' knowledge and provides a fantastic learning opportunity for your kids to learn through assessment.

Station 4

Apply Yourself!
Read the following information article and answer the associated questions found below.

Station 7

Word Wizardry (complete when you are done all other stations)
Create an exit summary for your learning during the lab. You must write what you learned from performing the lab that you didn't know before and what you would like to learn more about in the future regarding the topic. Your answer should be at least 4-5 sentences in total and include details and examples for full marks.

Save your time by utilizing dry labs. Just print and place around the room.

Station 1

Hands-On, Minds-On

Task: Create a detailed plant cell diagram on your Passport.
Label the following organelles and use specific colors:

- Nucleus (red)
- Cell membrane (blue)
- Cell wall (brown)
- Chloroplasts (green)
- Mitochondria (yellow)

Write one function for each labeled part.

Station 2

Fact Finder

Using the computer provided, research and answer the following questions on your Passport.

1. How do chloroplasts and mitochondria work together to keep a plant cell alive?
2. What would happen to a plant cell if it didn't have chloroplasts?

Station 3

Write This Way

Imagine you are a cell membrane. Explain your typical day at work protecting and managing your cell. Include at least three specific jobs you do. Your answer must be 5-7 sentences.

Station 4

Apply Yourself!

Read the following information article and answer the associated questions found below.

Station 4 - Apply Yourself

Scientists are turning to nature's architecture - specifically plant cell walls - to revolutionize how we build and create materials. Plant cell walls, those rigid structures surrounding plant cells, are teaching us valuable lessons about strength, flexibility, and sustainability.

Plant cell walls are made primarily of cellulose, a material that's both incredibly strong and surprisingly flexible. Think about a tall bamboo stalk: it can bend dramatically in strong winds without breaking, thanks to its cell wall structure. This same principle is now being applied to create better building materials.

For example, researchers at Green Building Labs have developed a new type of concrete that mimics the layered structure of cell walls. Traditional concrete, while strong, often cracks under pressure. But this bio-inspired concrete contains tiny fibers arranged in criss-crossing layers, similar to how cellulose fibers are arranged in cell walls. The result? A material that's 30% stronger and far more resistant to cracking.

Cell walls also teach us about adaptability. Different plants modify their cell walls based on their needs - desert plants have thicker walls to prevent water loss, while climbing vines have more flexible ones. Scientists are using this concept to create "smart" materials that can adjust their properties based on environmental conditions.

Perhaps most exciting is the development of new packaging materials. Traditional plastic packaging is a major environmental problem, but cell wall-inspired alternatives are showing promise. Companies are now producing packaging materials made from plant cellulose that are strong, flexible, and completely biodegradable - just like real cell walls!

Medical researchers are also getting in on the action. By studying how cell walls filter substances while maintaining cell structure, they're developing better drug delivery systems and wound dressings. Some hospitals are already using cell wall-inspired bandages that can control what substances pass through while maintaining moisture balance.

Reading Questions:

1. How are scientists using cell wall structure to improve concrete?
2. What property of cell walls allows bamboo to bend without breaking?
3. How are cell walls inspiring solutions to environmental problems?
4. What medical applications have been developed based on cell wall properties?
5. What specific characteristic of plant cell walls are desert plants known for?

Reading Questions: Answer Key

1. How are scientists using cell wall structure to improve concrete?
   They're creating concrete with criss-crossing fibers that mimic the arrangement of cellulose in cell walls, making it 30% stronger and more crack-resistant.
2. What property of cell walls allows bamboo to bend without breaking?
   The combination of strength and flexibility in the cellulose structure of cell walls.
3. How are cell walls inspiring solutions to environmental problems?
   They're inspiring the creation of biodegradable packaging materials made from plant cellulose as an alternative to plastic.
4. What medical applications have been developed based on cell wall properties?
   Bandages that can control substance passage while maintaining moisture balance, and improved drug delivery systems.
5. What specific characteristic of plant cell walls are desert plants known for?
   Desert plants have thicker cell walls to prevent water loss.

Station 5

Multiple Choice Madness

Answer the 10 multiple-choice questions on your passport.

Station 5 - Multiple Choice Madness

Instructions: Choose the correct answer and place it in the *Test Your Knowledge* section of your passport.

1. What is the primary function of the cell membrane?
   a) Produce energy
   b) Control what enters and exits the cell
   c) Store genetic material
   d) Produce proteins
2. Which organelle is responsible for converting light energy into chemical energy?
   a) Mitochondria
   b) Nucleus
   c) Chloroplasts
   d) Cell wall
3. The cell wall provides:
   a) Energy production
   b) Structural support
   c) Protein synthesis
   d) Genetic storage
4. Mitochondria are often called the "powerhouse" of the cell because they:
   a) Store water
   b) Make proteins
   c) Produce ATP (energy)
   d) Control cell division
5. The nucleus is important because it:
   a) Contains genetic material and controls cell activities
   b) Produces energy for the cell
   c) Protects the cell from damage
   d) Creates food for the cell
6. What is one key difference between plant and animal cells?
   a) Only plant cells have mitochondria
   b) Only plant cells have a nucleus
   c) Only plant cells have chloroplasts
   d) Only plant cells have a cell membrane
7. The cell membrane is best described as:
   a) Completely solid and rigid
   b) Selectively permeable
   c) Always completely open
   d) Made of cellulose
8. Which structure would you NOT find in an animal cell?
   a) Nucleus
   b) Cell wall
   c) Mitochondria
   d) Cell membrane
9. What is the main function of chloroplasts?
   a) Cell protection
   b) Energy storage
   c) Photosynthesis
   d) Protein production
10. The cell wall is:
    a) Found in all cells
    b) Flexible and thin
    c) Made of proteins
    d) Rigid and protective

Station 6

The Question Master

You must create 1 multiple-choice question, 2 true/false questions, and 1 short answer question that relates directly to the topic. You must also supply the answers, and you may not re-use any of the questions you have seen in this lab.

Station 7

Word Wizardry (complete when you are done all other stations)

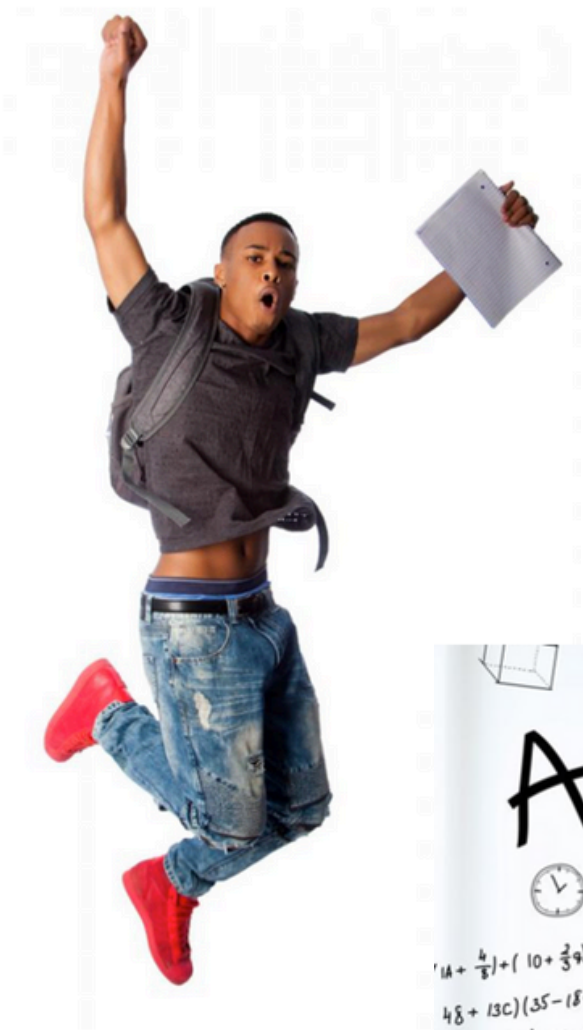
Create an exit summary for your learning during the lab. You must write what you learned from performing the lab that you didn't know before and what you would like to learn more about in the future regarding the topic. Your answer should be at least 4-5 sentences in total and include details and examples for full marks.

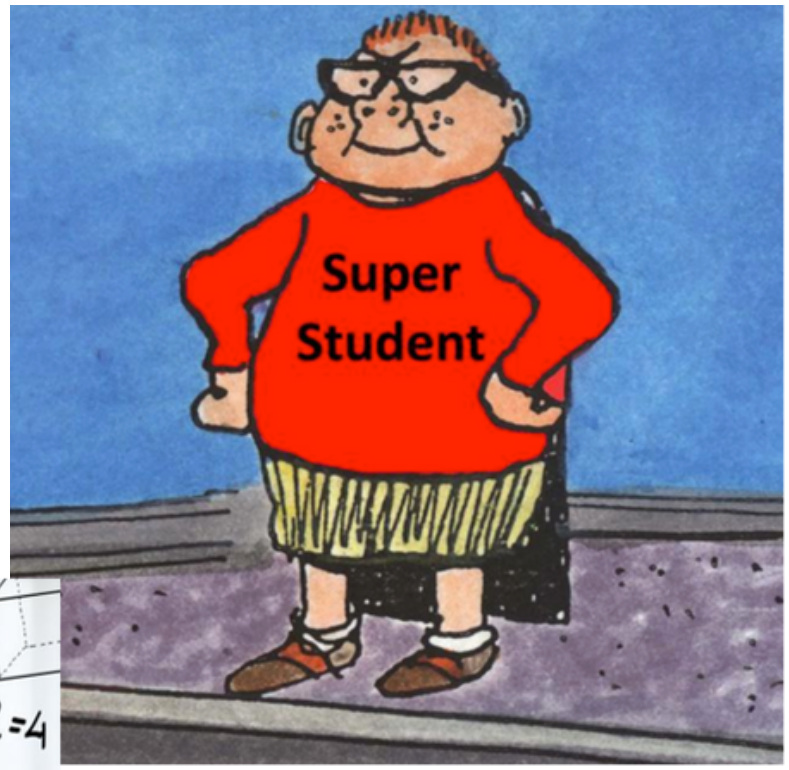
Example Stations

NGSS Station Activity

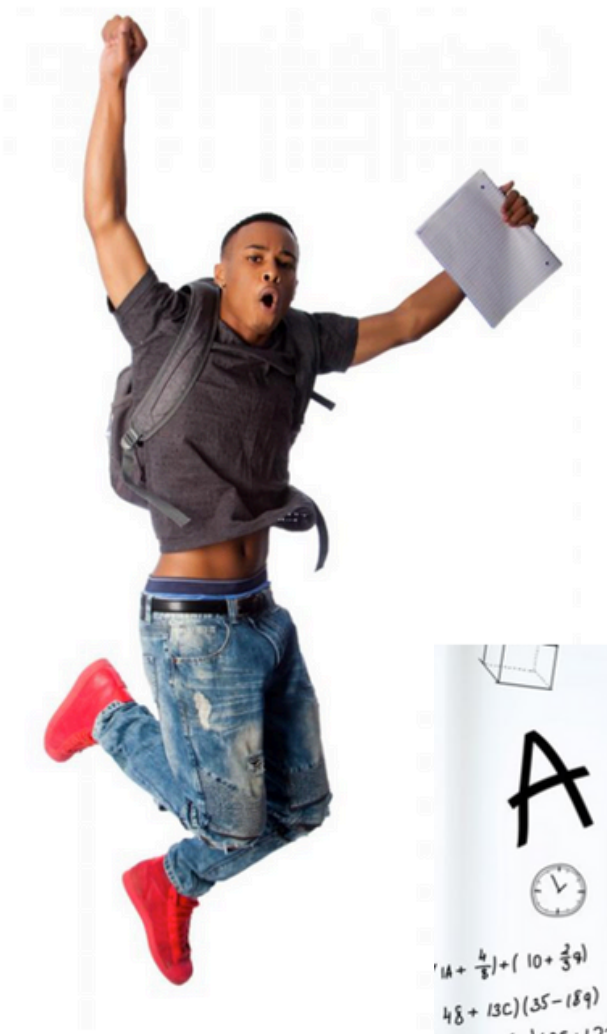
- Middle School Science Teachers
- Teachers using NGSS
- Teachers who want to increase their student's engagement and retention
- Teachers not looking to reinvent the wheel

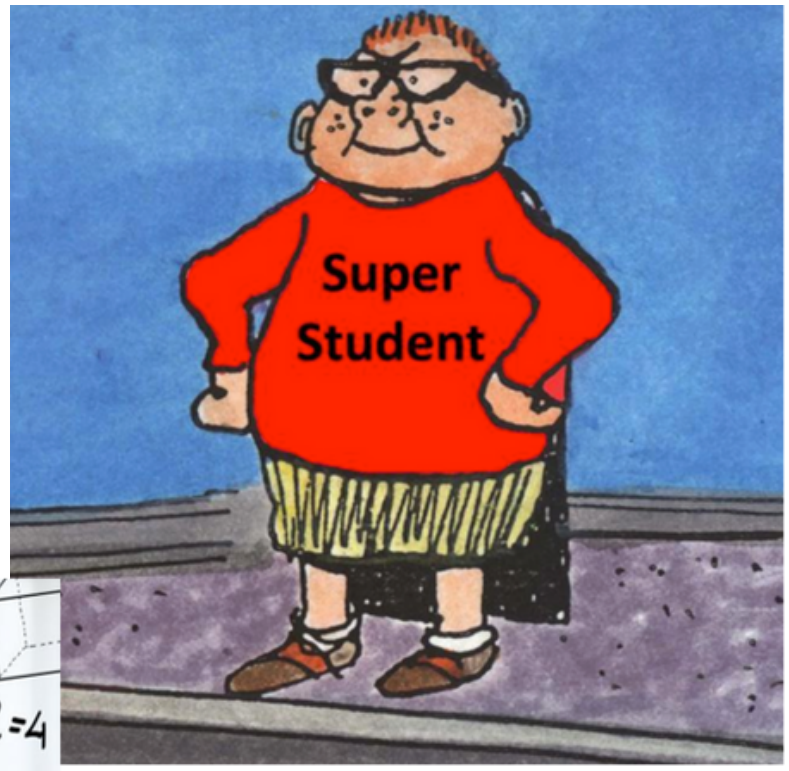
Create Engagment and Let Them Reach their Potential



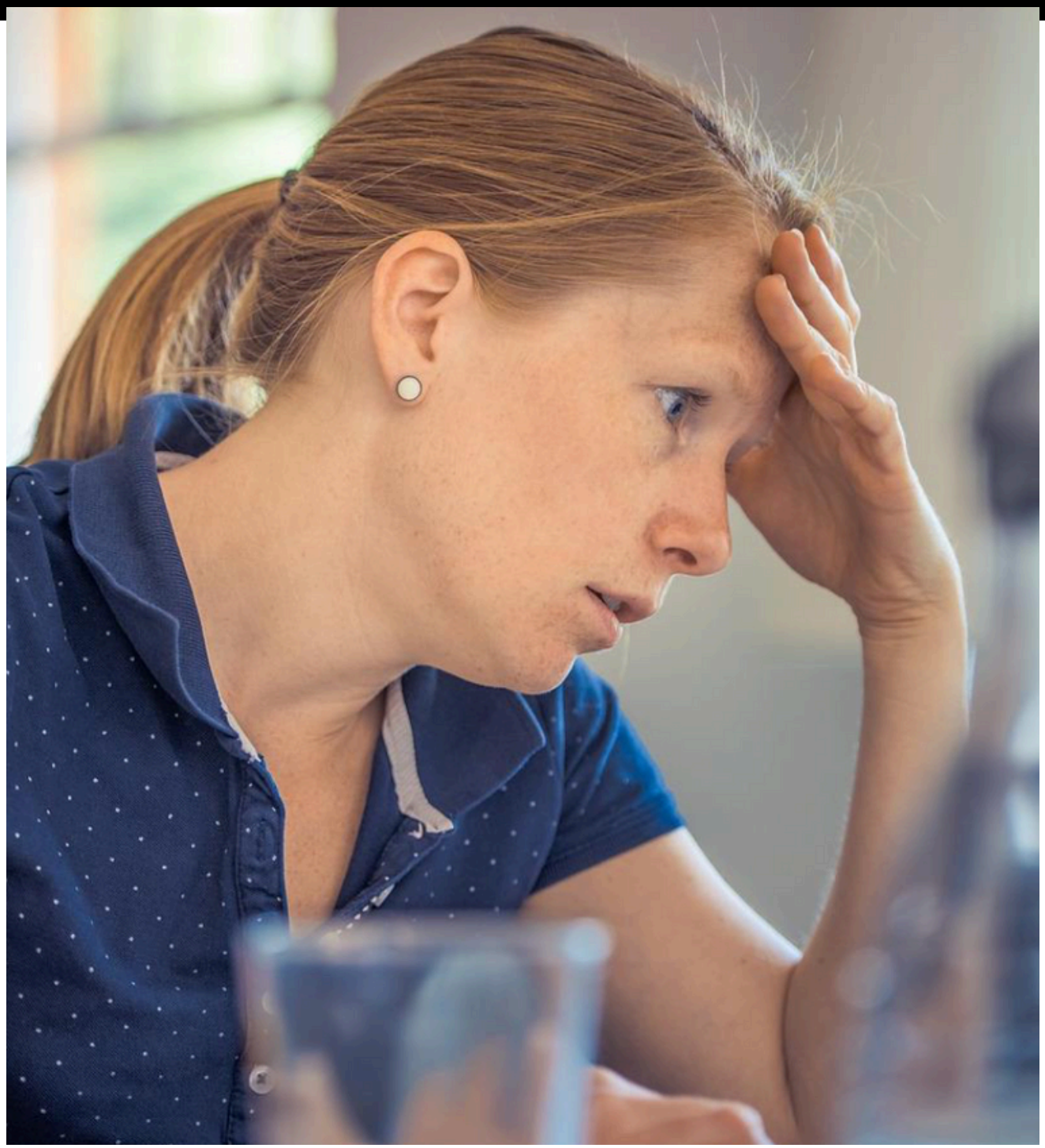
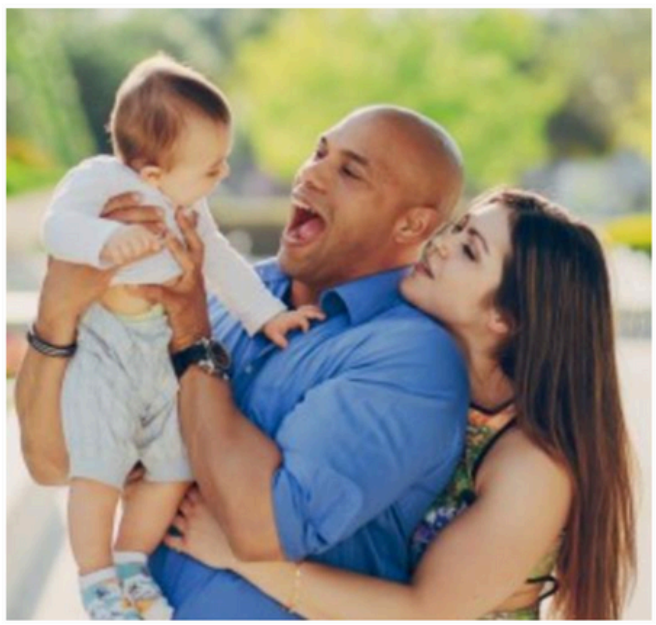


Incorporate Technology and Increase Collaboration





Save yourself the STRESS AND TIME



Spend your time WISELY